

WHAT IS CLAIMED IS:

1. A method for controlling the transmission power of a first station in a communication system wherein a radio signal is transmitted from this first station to a second station via a fluctuating transmission path:

which is characterized by:

5 predicting the future state of this transmission path; and

controlling the transmission power of the first station in accordance with this predicted future transmission path state.

2. A method for controlling the transmission power of radio signals in a communication system wherein these radio signals are transmitted and received between a first station and a second station via a fluctuating transmission path:

5 which is characterized by:

predicting the future state of this transmission path; and

controlling the transmission power of the radio signals in accordance with this predicted future transmission path state.

3. A method for controlling the downlink transmission power of a base station in a mobile communication system wherein downlink radio signals are transmitted from this base station to a mobile station via a downlink:

which is characterized by:

5 predicting the future state of this downlink transmission path; and

controlling the downlink transmission power of the base station in accordance with this predicted future transmission path state.

4. A method for controlling the uplink transmission power of a mobile

station in a mobile communication system wherein uplink radio signals are transmitted from this mobile station to a base station via an uplink:

which is characterized by:

- 5 predicting the future state of this uplink transmission path; and
 controlling the uplink transmission power of the mobile station in
 accordance with this predicted future transmission path state.

5. A method for controlling the transmission power of radio signals in a mobile communication system wherein these radio signals are transmitted and received between a mobile station and a base station via a link:

which is characterized by:

- 5 predicting the future state of the transmission path of this link; and
 controlling the transmission power of the radio signals in accordance
 with this predicted future transmission path state.

6. A method for controlling the downlink transmission power of a base station in a mobile communication system wherein downlink radio signals are transmitted from this base station to a mobile station via a downlink:

which is characterized by:

- 5 predicting the future position of the mobile station;
 obtaining the future state of the downlink transmission path
 corresponding to this predicted future position of the mobile station; and
 controlling the downlink transmission power of the base station on the
 basis of this future state of the downlink transmission path that has been
 10 obtained.

7. A method for controlling the uplink transmission power of a mobile station in a mobile communication system wherein uplink radio signals are

transmitted from this mobile station to a base station via an uplink:

which is characterized by:

- 5 predicting the future position of the mobile station;
- obtaining the future state of the uplink transmission path corresponding to this predicted future position of the mobile station; and
- controlling the uplink transmission power of the mobile station on the basis of the future state of the uplink transmission path that has been
- 10 obtained.

8. A method for controlling the transmission power of radio signals in a mobile communication system wherein these radio signals are transmitted and received between a mobile station and a base station via a link:

which is characterized by:

- 5 predicting the future position of the mobile station;
- obtaining the future state of the transmission path of this link corresponding to this predicted future position of the mobile station; and
- controlling the transmission power of the radio signals on the basis of this future transmission path state of the link that has been obtained.
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9. A method for controlling the downlink transmission power of a base station in a mobile communication system wherein downlink radio signals are transmitted from this base station to a mobile station via a downlink:

which is characterized by:

- 5 recognizing the present position of the mobile station;
- recognizing the present rate of movement of the mobile station;
- predicting the future position of the mobile station from its present position and present rate of movement;
- obtaining the future state of the downlink transmission path

- 10 corresponding to this predicted future position of the mobile station; and
controlling the downlink transmission power of the base station on the basis of this future state of the downlink transmission path that has been obtained.

10. A method for controlling the uplink transmission power of a mobile station in a mobile communication system wherein uplink radio signals are transmitted from this mobile station to a base station via an uplink:

which is characterized by:

- 5 recognizing the present position of the mobile station;
recognizing the present rate of movement of the mobile station;
predicting the future position of the mobile station from its present position and present rate of movement;
obtaining the future state of the uplink transmission path corresponding
10 to this predicted future position of the mobile station; and
controlling the uplink transmission power of the mobile station on the basis of this future state of the uplink transmission path that has been obtained.

11. A method for controlling the transmission power of radio signals in a mobile communication system wherein these radio signals are transmitted and received between a mobile station and a base station via a link:

which is characterized by:

- 5 recognizing the present position of the mobile station;
recognizing the present rate of movement of the mobile station;
predicting the future position of the mobile station from its present position and present rate of movement;
obtaining the future state of the transmission path of the link

- 10 corresponding to this predicted future position of the mobile station; and
controlling the transmission power of the radio signals on the basis of
this future transmission path state of the link that has been obtained.

12. A base station which controls its downlink transmission power in a
mobile communication system wherein downlink radio signals are transmitted
from this base station to a mobile station via a downlink:

which is characterized by comprising:

- 5 means for predicting the future state of the downlink transmission path;
and

means for controlling its downlink transmission power in accordance
with this predicted future transmission path state.

13. A mobile station which controls its uplink transmission power in a mobile
communication system wherein uplink radio signals are transmitted from this
mobile station to a base station via an uplink:

which is characterized by comprising:

- 5 means for predicting the future state of the uplink transmission path;
and

means for controlling its uplink transmission power in accordance with
this predicted future transmission path state.

14. A a mobile communication system for transmitting and receiving radio
signals between a mobile station and a base station via a link:

which is characterized by comprising:

- 5 means for predicting the future state of the transmission path of this
link; and

means for controlling the transmission power of these radio signals in

accordance with this predicted future transmission path state.

15. A base station which controls its downlink transmission power in a mobile communication system wherein downlink radio signals are transmitted from this base station to a mobile station via a downlink:

which is characterized by comprising:

5 means for predicting the future position of the mobile station;

means for obtaining the future state of the downlink transmission path corresponding to this predicted future position of the mobile station; and

means for controlling the downlink transmission power of the base station on the basis of this future state of the downlink transmission path that
10 has been obtained.

16. A mobile station which controls its uplink transmission power in a mobile communication system wherein uplink radio signals are transmitted from this mobile station to a base station via an uplink:

which is characterized by comprising:

5 means for predicting the future position of the mobile station;

means for obtaining the future state of the uplink transmission path corresponding to this predicted future position of the mobile station; and

means for controlling its uplink transmission power on the basis of this future state of the uplink transmission path that has been obtained.
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17. A mobile communication system for transmitting and receiving radio signals between a mobile station and a base station via a link:

which is characterized by comprising:

means for predicting the future position of the mobile station;

5 means for obtaining the future state of the transmission path of this link

corresponding to this predicted future position of the mobile station; and

means for controlling the transmission power of the radio signals on the basis of this future transmission path state of the link that has been obtained.

18. A base station which controls its downlink transmission power in a mobile communication system wherein downlink radio signals are transmitted from this base station to a mobile station via a downlink:

which is characterized by comprising:

5 means for recognizing the present position of the mobile station;

means for recognizing the present rate of movement of the mobile station;

means for predicting the future position of the mobile station from its present position and present rate of movement;

10 means for obtaining the future state of the downlink transmission path corresponding to this predicted future position of the mobile station; and

means for controlling the downlink transmission power of the base station on the basis of the future state of the downlink transmission path that has been obtained.

19. A mobile station which controls its uplink transmission power in a mobile communication system wherein uplink radio signals are transmitted from this mobile station to a base station via an uplink:

which is characterized by comprising:

5 means for recognizing its present position;

means for recognizing its present rate of movement;

means for predicting its future position from its present position and present rate of movement;

10 means for obtaining the future state of the uplink transmission path corresponding to this predicted future position of the mobile station; and

means for controlling its uplink transmission power on the basis of this future uplink transmission path state that has been obtained.

20. A mobile communication system in which radio signals are transmitted and received between a mobile station and a base station via a link:

which is characterized by comprising:

means for recognizing the present position of the mobile station;

5 means for recognizing the present rate of movement of the mobile station;

means for predicting the future position of the mobile station from its present position and present rate of movement;

means for obtaining the future state of the transmission path of the link corresponding to this predicted future position of the mobile station; and

10 means for controlling the transmission power of the radio signals on the basis of this future transmission path state of the link that has been obtained.

21. A base station which uses downlink transmission power control commands transmitted from a mobile station via an uplink to control its downlink transmission power in such manner that the downlink receiving state at this mobile station becomes good:

5 which is characterized by comprising:

a receiver for receiving uplink radio signals that have been transmitted via the uplink;

a downlink transmission power control command extractor for extracting the aforementioned downlink transmission power control commands from the
10 received uplink signal;

a mobile position recognizer for recognizing the present position of the mobile station from the received uplink signal;

a mobile velocity recognizer for recognizing the present rate of movement

of the mobile station from the received uplink signal;

15 a mobile position predictor for predicting the future position of the mobile station from its present position and present rate of movement;

 a database in which the state of the downlink transmission path has been recorded as a function of mobile position;

 a downlink transmission power controller for looking up the database on
20 the basis of the predicted future position of the mobile station, and for controlling the downlink transmission power of the base station on the basis of (i) the future state of the downlink transmission path obtained as a result of the lookup, and (ii) the aforementioned downlink transmission power control command; and

25 a transmitter for transmitting at the downlink transmission power instructed by the downlink transmission power controller.

22. The base station claimed in claim 21, wherein the database records the state of the downlink transmission path as a function of the position of the mobile station, where the state of the downlink transmission path has been evaluated from the time series of downlink transmission power control
5 commands that have been received.

23. The base station claimed in claim 21, wherein the state of the downlink transmission path is communicated from the mobile station to the base station, and the database records this communicated state of the downlink transmission path as a function of the position of the mobile station.

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24. The base station claimed in claim 21, wherein when it is predicted that the state of the downlink transmission path will deteriorate, the downlink transmission power controller increases the downlink transmission power in

advance within a range that does not exceed the maximum transmission power.

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25. The base station claimed in claim 21, wherein when it is predicted that the state of the downlink transmission path will become very poor, the downlink transmission power controller does not increase the downlink transmission power.

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26. The base station claimed in claim 21, wherein the database controls transmission power during diversity handover by sharing information with a plurality of base stations.

27. A base station which uses uplink transmission power control commands transmitted from the base station via a downlink to control the uplink transmission power of a mobile station in such manner that the uplink receiving state at this base station becomes good:

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which is characterized by comprising:

a receiver for receiving uplink radio signals that have been transmitted via the uplink;

an uplink receiving state estimator for estimating the receiving state of the uplink from the received uplink signal;

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a mobile position recognizer for recognizing the present position of the mobile station from the received uplink signal;

a mobile velocity recognizer for recognizing the present rate of movement of the mobile station from the received uplink signal;

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a mobile position predictor for predicting the future position of the mobile station from its present position and present rate of movement;

a database in which the state of the uplink transmission path has been recorded as a function of mobile position;

an uplink transmission power control command generator for looking up the database on the basis of the predicted future position of the mobile station, and for generating an uplink transmission power control command for controlling the uplink transmission power of the mobile station on the basis of (i) the future state of the uplink transmission path obtained as a result of the lookup, and (ii) the aforementioned estimated uplink receiving state;

a mixer for outputting the mixed signal obtained by mixing the downlink data with the aforementioned generated uplink transmission power control command; and

a transmitter for transmitting the mixed signal.

28. The base station claimed in claim 27, wherein the database records the state of the uplink transmission path as a function of the position of the mobile station, where the state of the uplink transmission path is evaluated from the level of the received uplink signal.

29. The base station claimed in claim 27, wherein the database records the state of the uplink transmission path as a function of the position of the mobile station, where the state of the uplink transmission path is evaluated from the SIR of the data after the received uplink signal has been demodulated.

30. The base station claimed in claim 27, wherein the database records the state of the uplink transmission path as a function of the position of the mobile station, where the state of the uplink transmission path is evaluated from the BER of the data after the received uplink signal has been demodulated.

31. The base station claimed in claim 27, wherein the database records the state of the uplink transmission path as a function of the position of the mobile

station, where the state of the uplink transmission path is evaluated from the FER of the data after the received uplink signal has been demodulated.

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32. The base station claimed in claim 27, wherein the database records the state of the uplink transmission path as a function of the position of the mobile station, where the state of the uplink transmission path is evaluated from the estimated state of the transmission path.

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33. The base station claimed in claim 27, wherein, when it is predicted that the state of the uplink transmission path will deteriorate, the uplink transmission power control command generator generates an uplink transmission power control command that increases the uplink transmission power in advance.

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34. The base station claimed in claim 27, wherein, when it is predicted that the state of the uplink transmission path will become very poor, the uplink transmission power control command generator generates an uplink transmission power control command that does not increase the uplink transmission power.

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35. The base station claimed in claim 27, wherein the database controls transmission power during diversity handover by sharing information with a plurality of base stations.

36. A mobile station which uses uplink transmission power control commands transmitted from a base station via a downlink to control its uplink transmission power in such manner that the uplink receiving state at the base station becomes good:

5 which is characterized by comprising:

 a receiver for receiving downlink radio signals that have been transmitted via the downlink;

 an uplink transmission power control command extractor for extracting the aforementioned uplink transmission power control commands from the
10 received downlink signal;

 a mobile position recognizer for recognizing the present position of the mobile station;

 a mobile velocity recognizer for recognizing the present rate of movement of the mobile station;

15 a mobile position predictor for predicting the future position of the mobile station from its present position and present rate of movement;

 a database in which the state of the uplink transmission path has been recorded as a function of mobile position;

 an uplink transmission power controller for looking up the database on
20 the basis of the predicted future position of the mobile station, and for controlling the uplink transmission power of the mobile station on the basis of (i) the future state of the uplink transmission path obtained as a result of the lookup, and (ii) the aforementioned uplink transmission power control commands; and

25 a transmitter for transmitting at the uplink transmission power instructed by the uplink transmission power controller.

37. The mobile station claimed in claim 36, wherein, when it is predicted that the state of the uplink transmission path will deteriorate, the uplink transmission power controller increases the uplink transmission power in advance within a range that does not exceed the maximum transmission power.

38. The mobile station claimed in claim 36, wherein when it is predicted that the state of the uplink transmission path will become very poor, the uplink transmission power controller does not increase the uplink transmission power.

39. A mobile station which uses downlink transmission power control commands transmitted from the mobile station via the uplink to control the downlink transmission power of a base station so that the downlink receiving state at the mobile station becomes good:

5 which is characterized by comprising:

a receiver for receiving downlink radio signals that have been transmitted via the downlink;

a downlink transmission path state estimator for estimating the present state of the downlink transmission path from the received downlink signal;

10 a mobile position recognizer for recognizing the present position of the mobile station;

a mobile velocity recognizer for recognizing the present rate of movement of the mobile station;

15 a mobile position predictor for predicting the future position of the mobile station from its present position and present rate of movement;

a database in which the state of the downlink transmission path has been recorded as a function of mobile position;

20 a downlink transmission power control command generator for looking up the database on the basis of the predicted future position of the mobile station, and for generating downlink transmission power control commands for controlling the downlink transmission power of the base station on the basis of (i) the future state of the downlink transmission path obtained as a result of the lookup, and (ii) the aforementioned estimated present state of the transmission path;

25 a mixer for outputting the mixed signal obtained by mixing the uplink data with the aforementioned generated downlink transmission power control command; and

 a transmitter for transmitting the mixed signal.

40. The mobile station claimed in claim 39, wherein, when it is predicted that the state of the downlink transmission path will deteriorate, the downlink transmission power control command generator generates a downlink transmission power control command that increases the downlink transmission
5 power in advance.

41. The mobile station claimed in claim 39, wherein, when it is predicted that the state of the downlink transmission path will become very poor, the downlink transmission power control command generator generates a downlink transmission power control command that does not increase the downlink
5 transmission power.